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TECHNICAL SPECIFICATION

FORMAT SPECIFICATION OF MUSCATE LEVEL-2-BIO PRODUCTS

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TITLE :

Technical Specification

FORMAT SPECIFICATION OF MUSCATE LEVEL-2-BIO PRODUCTS

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GLOSSARY AND LIST OF TBC AND TBD ITEMS

PHOEBUS	Processing High Level Orchestration Engine and BUiness Services

List of TBC items:

List of TBD items:

1. OVERVIEW

1.1. SCOPE OF THE DOCUMENT

The aim of this document is to provide a definition for the Level-2-BIO format in the scope of the Muscate project.

1.2. REFERENCE DOCUMENTS

RD1 GeoTIFF Format specification GeoTIFF revision 1.0 Specification Version 1.8.2 Last Modified 10 November , 1995
Geotiff

RD2 Geospatial Data abstraction Library http://www.gdal.org
Gdal

1.3. APPLICABLE DOCUMENTS

AD1 SPECIFICATION DE FORMAT DES PRODUITS (SPECIFICATIONS LOGICIELLES)
CLESSE Dominique, 06/01/2017, Issue 01, Rev. 09
PSC-SL-411-0032-CG

AD2 Spécifications Technique de Besoin MUSCATE
Issue 01, Rev. 00
PSC-ST-40-0049-CN

2. NEW FORMAT DESCRIPTION

This section will create a single and Muscate-compliant Level-2-BIO format definition. It will be defined so that the format is still corresponding to a Muscate-product but with all L2-BIO information included. This requires to include the resulting L2-BIO masks and metadata.

2.1.1. Main Folder

The main folder of the format will be named after the Muscate 3.1 Level-3 convention, which is shown in the following:

MISSION_YYYYMMDD-xxxxxx-xxx_L2-BIO_TTILE#_C_Vx-x

MISSION : The mission name, which can be:

- SENTINEL2A
- SENTINEL2B
- LANDSAT8-OLITIRS
- VENUS-XS

YYYYMMDD : The synthesis date in the given format

xxxxxx-xxx: The Time in format HHmmSS-sss with sss being the milliseconds

TILE# : The Tile identifier

x-x : The Product version: Starting from 0-1 and increasing by 0-1 for a minor reprocessing or 1-0 for a major one.

2.1.2. Biophysical variables

The processing chain outputs a single composite image with surface reflectance (FRC) values of the given inputs. The naming convention for it is:

MISSION_YYYYMMDD-xxxxxx-xxx_L2-BIOA_TTILE#_C_ Vx-x_var_ALL.tif

var: The variable trigram.

The following variables are supported:

Name	Trigram
FAPAR	FPR

FCOVER	FCO
LAI	LAI
LAI_Cab	CAB
NDVI	NDV

2.1.3. Accompanying masks

The masks generated by the processor are described in the following section. For all variable rasters (see above), a mask of the corresponding resolution is available.

The respective files are located inside the MASKS folder of the root, with the filename being:

MISSION_YYYYMMDD-xxxxxx-xxx_L2-BIOA_TTILE#_C_ Vx-x_XXX_ALL.tif

XXX: The trigram for each mask

Name	Trigram
FAPAR output	NFA
FCOVER output	NFC
LAI output	NLA
LAI_Cab output	NCA
NDVI output	NND
Input mask	INP

The rest can be found above.

2.1.4. Metadata-file

The main Metadata-file is located in the product root folder, called

MISSION_YYYYMMDD-xxxxxx-xxx_L2-BIOA_TTILE#_C_ Vx-x_MTD_ALL.XML

With all the name conventions explained above.

2.2. METADATA INFORMATION TABLE

The following table illustrates where the information for each field comes from, similar to the table found in AD1

Field Name	Origin	Commentary
METADATA_FORMAT	Constant	=METADATA_MUSCATE
METADATA_PROFILE	Constant	GENERIC
METADATA_INFORMATION	Constant	=EXPERT
PRODUCT_ID	Calculated following the format above	
AUTHORITY	Constant	=THEIA
PRODUCER	Constant	=MUSCATE
PROJECT	Calculated	
GEOGRAPHICAL_ZONE	Native metadata	
ACQUISITION_DATE	Calculated	Date for the temp. synthesis
PRODUCTION_DATE	Calculated	Current time of processing
PRODUCT_VERSION	Calculated	Starting at 1.0, then 1.1 ...
PRODUCT_LEVEL	Calculated	=L2-BIO
PLATFORM	Native metadata	
ORBIT_NUMBER	Constant	
UTC_Acquisition_Range/MEAN	Native metadata	
Band_Global_List	Native metadata	With platform-id and count
Band_Group_List	Native metadata	ALL

QUICKLOOK	Calculated	
IMAGE_FILE	Calculated	According to the naming convention above
MASK_FILE	Calculated	According to the naming convention above
DATA_FILE	Calculated	According to the naming convention above
GEO_TABLES	Constant	=EPSG
HORIZONTAL_CS_TYPE	Native metadata	
HORIZONTAL_CS_NAME	Calculated	
HORIZONTAL_CS_CODE	Native metadata	
RASTER_CS	Native metadata	
METADATA_CS	Native metadata	
Geopositioning	Native metadata	According to the synthesis-input
REFLECTANCE_QUANTIFICATION_VALUE	Constant	=10000
SPECIAL_VALUE	Constant	Nodata = 255
Spectral_Band_Informations_List	Native metadata	According to the platform
SPATIAL_RESOLUTION	Native metadata	Only field inside the Spectral_Band_Informations_List to be filled out; Mandatory for MUSCATE
Product_Quality_List	Calculated	level=N2BIO (constant) PRODUCT_ID, ACQUISITION_DATE and PRODUCTION_DATE according to the same fields above CloudPerfect Quality_Index is calculated
Contributing_Products_List	Calculated	level=N2A PRODUCT_ID, SYNTHESIS_DATE, PRODUCTION_DATE and Quality_Index according to the input files

Processing_Information	Calculated	This section is added by PHOEBUS during the processing

3. GEOTIFF FORMATS

The new format will exist in two versions, which are specified in the following.

3.1. CLASSICAL GEOTIFF

This format is compliant to the GeoTIFF specification of RD1 and RD2. This implies that all images described above are stored in the GeoTiff format set by GDAL.

A GeoTiff is a .tif image with added geometrical information in its metadata-header, which sets the projection, resolution and position of it.

3.2. CLOUD-OPTIMIZED GEOTIFF

This is a rather new format, which is based on 3.1 but

"A Cloud Optimized GeoTIFF (COG) is a regular GeoTIFF file, aimed at being hosted on a HTTP file server, with an internal organization that enables more efficient workflows on the cloud. It does this by leveraging the ability of clients issuing HTTP GET range requests to ask for just the parts of a file they need."

(cf. http://www.cogeo.org/)

The specifications and how to transform the regular GeoTiff to a CoG one can be found under:

https://trac.osgeo.org/gdal/wiki/CloudOptimizedGeoTIFF

The format incorporates the Gdal-Overviews as well as adds a compression to each image. Hence, the increase of size by adding the overview is partly equalized by the compression. This, however, results in a more varying product size, which will be described in **Erreur ! Source du renvoi introuvable.**.

A description when each format is used can be found in the next section.

3.3. FORMAT COMPATIBILITY

Because 3.2 is fully compatible to 3.1 as long as it is a fully defined GeoTiff as stated in RD1 , there is no difference to the user. To describe which of the two is used, the field *Description* and Compression for each Image and Mask in the Product_Characteristics-Section are filled out as follows:

GeoTiff:

```
<COMPRESSION>None</COMPRESSION>
<DESCRIPTION>GeoTiff</DESCRIPTION>
```

Co-GeoTiff:

```
<COMPRESSION>DEFLATE</COMPRESSION>
<DESCRIPTION>CloudOptimized-GeoTiff</DESCRIPTION>
```

4. EXAMPLES

The following excerpt shows the resulting project structure for a complete L2-BIO product:

4.1. PRODUCT STRUCTURE

```
.
├── DATA
├── MASKS
│   ├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_INP_ALL.tif
│   ├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NCA_ALL.tif
│   ├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NFA_ALL.tif
│   ├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NFC_ALL.tif
│   ├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NLA_ALL.tif
│   └── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NND_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_CAB_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_FCO_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_FPR_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_LAI_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_MTD_ALL.xml
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_NDV_ALL.tif
├── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_QKL_ALL.jpg
└── SENTINEL2B_20181003-105619-632_L2B-BIO_T31TCH_C_V0-1_VIS_ALL.tif
```